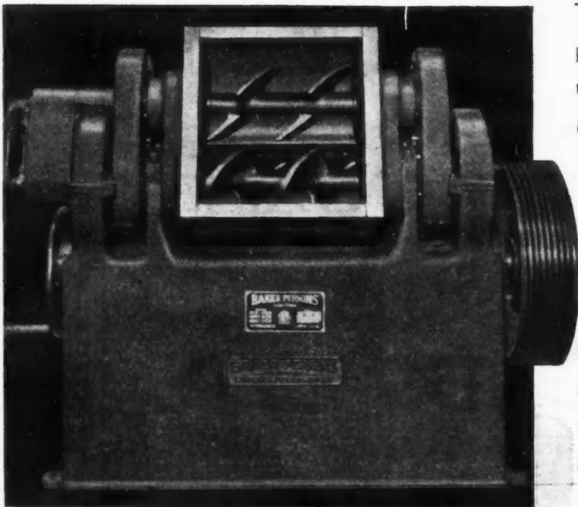
The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

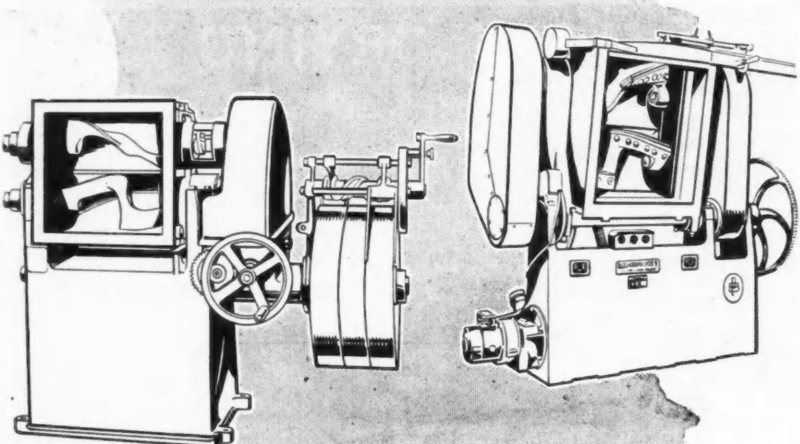
VOL. LI No. 1328 | SATURDAY, DECEMBER 9, 1944 | REGISTERED AS A NEWSPAPER | 6D. PER COPY POST FREE 8D.

Universal Mixers



The Universal mixing principle is adaptable to a large variety of industrial processes.

Here are three of our range of Universal Mixers, of 8, 18, and 88 galls. working capacity respectively.



BAKER PERKINS LTD

WESTWOOD WORKS — PETERBOROUGH

We can accept orders to build these machines for work of national importance

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (10 lines)

GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784 5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LI No. 1328. December 9, 1944 Annual Subscription 21s. Overseas 26s.

The Supply of Chemical Products

THE eighth Report of the Select Committee on National Expenditure, which deals with the chemical controls, carries implications in a wider field than that covered by it. Extracts from the Report and comments on it appeared in our columns on November 18 (pp. 479, 477), and from these it will be seen that the present report deals with the operation of five main chemical controls. The Report answers some of the criticisms that have been heard about the operation of these controls, and shows that the apparent failure to utilise the full manufacturing capacity of the country was due to war-time exigencies. The Committee has been satisfied that the decisions in these cases were made properly.

We are threatened, however, with greater Government control after the war, and it is not beyond the bounds of possibility that the maintenance of full employment will require some regulation of the capacity for production in particular industries and of the manner in which it is used. A certain proportion of our manufactures can be sold at home, but a great and increasing proportion must be for export. The export market depends primarily on quality and price. The maintenance of low prices generally demands high output, which in turn means that the existing capacity must be used to the fullest possible extent. An industry which has allowed itself to accumulate too much capacity may find itself handicapped in costs, and unless prices are controlled there may be the further handicap of uneconomic price-cutting. It is thus of some interest to observe what has been the procedure of Ministries in the distribution of capacity.

The principle has been that where a firm has been successfully making a product in the past and also has the organisation to enable it to undertake the necessary capacity, the creation and management of new capacity has been entrusted to that firm. We do not think that there can be much complaint with this as a principle, particularly if the firm's position is based on sound and valid patents. Under normal trading conditions such a firm would be expected to extend its manufacturing capacity to supply whatever new markets presented themselves, or could be discovered. In war the output required is generally supplied to Government order and is therefore known. In

On Other Pages

peace the output may be greatly extended by skilful salesmanship at home and abroad. If a particular firm is not able or willing thus to extend its markets it is clearly in the interests of the nation to encourage some other more enterprising firm to do so. That may be a matter for Government control, it may be a matter of cartel arrangements, and it will almost certainly involve patent procedure. It is a moot point whether a compulsory patent licence should be granted on the ground that a firm could sell more of its output but for some reason does not wish to do so. It would always be desirable that firms which could offer alternative materials should be encouraged to do so. Many materials and products are not yet perfect and a new firm *may* improve on the products of the previous manufacturer.

The Committee has particularly discussed the supply of plastics for aeroplane windows, and we agree with their criticism that since the original product was not perfect other firms fully qualified for the task should have been encouraged to develop an alternative material; it appears that not only were they not encouraged to do so, but they were actually discouraged from such a course. This opens up the question of the encouragement that could or should be given by the Government to private firms. Normally, such assistance would be given by the research association of the industry—if there is one—and this is no doubt the right method of solving technical difficulties for small firms which have no large research organisation of their own. The Government, with its large pool of skilled technical men, can be of immense help to small firms struggling to improve their methods or products.

A good deal of criticism has obviously been directed against the concentration of manufacture, including contracts for research and development, within one particular company, and it is pointed out by the Committee that another large company did not receive a single contract, the reason apparently being that this company was not prepared to allow officials from the Ministry to know exactly what was going on, *i.e.*, it was not prepared to disclose its methods to anyone who cared to come and look at them. This concentration upon a particular firm has been a matter of disagreement in directions other than that referred to in the report and has been the policy of other departments also, we believe.

A glaring case is that of chemical engineering plant. It is common knowledge that there is in Great Britain a chemical engineering plant industry. That industry has never had the Government backing that has been accorded to the German chemical plant industry and, as a result, we find ourselves lacking, not perhaps in skill, but certainly in capacity and experience. The same thing happened during the last war with the glass industry; the result was that the Government encouraged the glass industry and it has now been brought fully up to the level of its continental counterparts. This time the Government departments took a narrower view. Because a particular firm engaged in the manufacture of chemicals indicated its willingness to erect and operate chemical factories, it was allowed to do so to the exclusion of the chemical plant industry. The result has been that the chemical plant industry has not received adequate—if any—Government backing during the war and is very little better equipped for the necessary peace export drive than it was in 1939. It has been deprived of the opportunity of obtaining experience in the manufacture and construction and operation of chemical plant for the Government. All this knowledge which should have been disseminated over the British chemical plant industry has been "frozen" among the staff and archives of a few chemical manufacturers who will obviously not engage in the manufacture of chemical plant after the war for sale generally or for export. There would have been much less criticism if the Government had called in the B.C.P.M.A. as a body to erect the necessary installations and had agreed with the chemical industry on a pooling of information and resources.

We cannot avoid the conclusion that Government action in the supply and erection of chemical plant during the war has been detrimental to the chemical plant industry—an industry which the Government should have actively encouraged, as the glass and fine chemical industries were encouraged in the last

war. We cannot avoid the conclusion that certain branches of the Civil Service—whether through temporary or permanent members of that service we do not know—have simply taken the line of least resistance. This problem of competitive power in the export market must be tackled seriously. While politics and salesmanship have something to do with it, the essential requirement for selling chemical plant abroad is technical ability.

NOTES AND COMMENTS

Publicity for India

THE Indian scientists who have been staying in this country as guests of His Majesty's Government held a Press conference on the eve of their departure for Ottawa—where they will attend a conference of scientists of the British Commonwealth—and for the United States. Our visitors were given an unrestricted insight into the working of our productive machinery and they had an opportunity of closely examining the organisation of British scientific research, as well as its practical application. They declared themselves highly impressed by our achievements, especially as regards the mobilisation of our scientific man-power: and it is to be hoped that their impressions will soon and adequately be translated into action. In meeting India's main needs, *viz.*: electric power, transport, fertilisers, and trained personnel, British science and industry can play an important part. At present it is unfortunately true, as Professor Saha emphatically pointed out, that there is, in the national Press of this country, an almost complete absence of news about India. "The British papers pay less attention to India than to the planet Mars." However, in reply to our representative, Professor Saha stated that his remarks applied to the lay Press only, and by no means to the scientific and technical Press, which has reported developments in India accurately and fully.

Hydrogen in Defence

ON a later page of this issue, we give some account of the various thermal methods by which hydrogen is produced for industrial purposes. By a coincidence, the curtain was raised a little last week on one of the war-time uses for this lightest of gases, when representatives of the Press were invited to inspect a typical gas plant where hydrogen has been produced and filled into cylinders for supply to barrage balloon centres and sites. The flying of a balloon barrage requires hydrogen far in excess of the supply normally obtainable from industrial sources, except for a few special industries which use the gas or produce it as a by-product. These industries are, broadly speaking, concentrated in northern England, and when, in 1940, enemy activity was at its height, the limit of transport of hydrogen cylinders from the North was reached. To overcome this difficulty a new source of supply had to be created at short notice, and it was decided to seek the co-operation of the gas industry, and to employ, in addition to the plants already under construction at gas works, many more new plants of a smaller type with a greater degree of dispersal, and situated with reference to the barrage as then planned. The desired output was 40 million cu. ft. per week, of which some 25 million would be supplied by gas works. The process used is the old-established steam-iron process, a full account of which is given in subsequent pages.

The Gas Industry's Share

THE first of the plants at gas works went into operation in September, 1940, and other plants came in at regular intervals up to the middle of 1942. The quantity of hydrogen supplied from the gas industry up to September this year has been 1773 million cu. ft.; and as the enemy's attack came to be more localised, there was a general tendency to reduce barrage protection in the North and West, and concentrate it in the South and East, with the result that the gas industry's proportion of the total load increased year by year. The following figures give some idea of the proportions of the amount of hydrogen supplied to the balloon barrage, in

millions of cubic feet. In 1940, from gas works, 43, from other sources, 545; in 1941 the corresponding figures were 305 and 434; in 1942, 452 and 316; in 1943, 542 and 265; in 1944 (9 months), 431 and 157. Special preparations were made for D-Day and for a barrage against the flying bomb, and when it became necessary to concentrate the whole strength of the barrage south of London, the time and distance involved made it impossible to bring cylinders from the industrial North. A special effort was called for from the gas works, and in one week when the demand was at its height two factories reached outputs $2\frac{1}{2}$ times their normal rating. At last week's meeting, which was held at the South of England plant which was the pioneer in the supply of "barrage hydrogen," Air Commodore P. L. Lincoln, D.S.O., M.C., deputy A.O.C. Balloon Command, spoke of the difficulties involved in the regular supply of hydrogen under war conditions. Production came, he said, under the eventual control of the Director of Hydrogen Production, Air Ministry, and the aim was to consider a hydrogen factory as a "running tap" from which a succession of cylinders would always be available. The goal was attained, in spite of the increasing number of plants involved.

No Shortage of Hydrogen

ENVISAGING the possibility of a shortage of hydrogen, experiments were made using varying percentages of coal gas as an inflating medium. These showed that, although operational efficiency was impaired, it was possible to fly a balloon with an admixture of coal gas and hydrogen. As new hydrogen plants came into production, however, coal gas needed to be used only in an emergency. It is interesting to record that an instrument, designed at a gas works, was used as a percentage oxygen meter to determine the point at which a hydrogen/coal-gas mixture with air became dangerous. Throughout the life of Balloon Command, Air Commodore Lincoln said, the provision of barrages for special commitments was never affected by lack of hydrogen; and he expressed his thanks to the personnel of the gas-producing factories. In acknowledgment of this, Mr. A. E. Sylvester, chairman of the Gas Advisory Committee, explained how delighted his industry had been to be able to co-operate in the defence of Britain. To their old slogan, "Gas never lets you down," they were able to add a new one: "Keep the balloons up." The practical point of view was summed up by the engineer and manager of the gas works concerned, with an account of the way in which some of the early difficulties of hydrogen production had been surmounted in the actual works.

News from Morocco

EXAGGERATED reports have been quoted, in a well-known American industrial weekly, regarding the alleged importance of a manganese mine at Bouarfa, about 80 miles N.W. of Colomb Béchar, in French Morocco. It has been described as "the most important manganese mine" in French Morocco, and highly-coloured stories of an "industrial city . . . in the open desert" have been put about. Further, the mine is said to have "supplied Great Britain with large quantities in 1943," an output of 45,000 metric tons being recorded for the year 1940. In view of the above statements, it is somewhat surprising to read, on the other hand, that "the mines are reported to be idle now, and competition with world markets after the war is not excepted (*sic*) because of transportation and labour difficulties." At the same time, we read, "with a view to meeting possible future needs of French industry, modern machinery costing 60,000,000 francs has been installed." So stimulating a description merited further investigation, we thought; and the facts of the case were most efficiently secured for us, with some difficulty, by an official and trustworthy informant. They are somewhat less romantic than the original, but deserve to be recorded in the cause of accuracy. Bouarfa is not the most important manganese mine in French Morocco; the ore produced from it is of low grade, containing only about 30 per cent. of manganese; and only very small quantities were supplied to Britain during 1943. Perhaps, however, the ruins of the "industrial city" will one day rank with the columns of Volubilis as one of the attractions for the tourist in Morocco.

Thermal Methods for Hydrogen Production

I. The Steam-Iron Process

by D. D. HOWAT, B.Sc., Ph.D., F.R.I.C., A.M.I.Chem.E.

THE production of hydrogen by electrolysis of water has been discussed in an earlier series of articles.[1] This process is fairly expensive but may be usefully applied in relatively small-scale plant: but where large resources of natural fuels, either coal or gas, are available, a thermal reduction process may compete successfully with water electrolysis for the production of the large quantities of hydrogen required in, say, a synthetic ammonia plant. In such cases the cheap natural fuel offsets the increased purification costs involved.

The steam-iron process, the oldest method of producing hydrogen on a commercial scale, still functions for a large variety of purposes, some interesting developments having occurred within the past few years.

From any water-gas generator, exit gases carrying up to 50 per cent. hydrogen may be produced. Catalytic conversion of the 40 per cent. carbon monoxide may be efficiently carried out, giving a mixture of hydrogen and carbon dioxide, removal of the latter being comparatively simply effected. This process of hydrogen production has made rapid strides in recent years and is widely employed, practically all the hydrogen required in synthetic ammonia plants in this country being produced by this method.

Ample supplies of natural gas, containing approximately 80 per cent. methane and 15-18 per cent. ethane, have provided a convenient and economic source of hydrogen in the U.S.A. In the first stage of decomposition the natural gas yields a mixture of hydrogen and carbon monoxide; the second stage comprises the catalytic conversion of the carbon monoxide. Varying quantities of sulphur compounds, and of carbon monoxide and dioxide contaminate the hydrogen produced from the natural fuels. Of these impurities, carbon dioxide is the least objectionable and most easily eliminated, but where hydrogen is to be used in catalytic processes almost complete elimination of sulphur and carbon monoxide is essential. Considerable operating difficulties have been experienced with the various purification processes.

An Old-Established Process

The steam-iron process for hydrogen production has long been established. The first design of retort plant for this process of hydrogen production was invented in 1903 by Lane.[2] The basis of the process is a two-phase cycle of reduction and steaming reactions, the two phases being known as the reducing and steaming phases. During the reduction phase the mixture of iron oxides, present in the charge of calcined ore, is reduced with blue-water gas to ferrous oxide and metallic iron. As blue-water gas contains both carbon monoxide and hydrogen the reduction involved may be expressed as:—

$$2Fe_3O_4 + H_2 + CO = 6FeO + CO_2 + H_2O \ldots (1)$$

$$2FeO + H_2 + CO = 2Fe + CO_2 + H_2O \ldots (2)$$

In the steaming phase the mixture of ferrous oxide and metallic iron is oxidised with the decomposition of the steam and the liberation of hydrogen.

$$Fe + H_2O = FeO + H_2 \ldots\ldots\ldots\ldots (3)$$

$$3FeO + H_2O = Fe_3O_4 + H_2 \ldots\ldots\ldots\ldots (4)$$

Reactions (1) and (2) are exothermic and reactions (3) and (4) endothermic; provision must be made therefore to store the heat liberated during the reducing phase to maintain the temperature during the steaming phase. In actual fact the waste gases produced during the reducing phase—normally described as the "residual gases"—contain appreciable amounts of unburned hydrogen, hydrocarbons, and carbon monoxide. Secondary air is provided to complete the combustion of the residual gases which are then treated for the absorption of the heat.

The simplest form of apparatus is a retort, many different forms and modifications of the original design having been suggested. In contrast to the

modern single-retort plant, Lane's original design comprised an arrangement of 36 retorts, in three sections of twelve, set in a brick furnace chamber heated by gas burners. The arrangement of valves and connections allowed the reducing phase to be twice as long as the steaming phase. The production of hydrogen for Army purposes (such as balloon filling) was the main demand from the earliest plant designs which operated only intermittently. When continuous operation of these plants became essential, considerable practical difficulties were at once experienced.

In 1913 the Messerschmitt retort was invented—the first of the modern single-retort type of plant. This was followed by the Bamag retort, shown in Fig. 1.

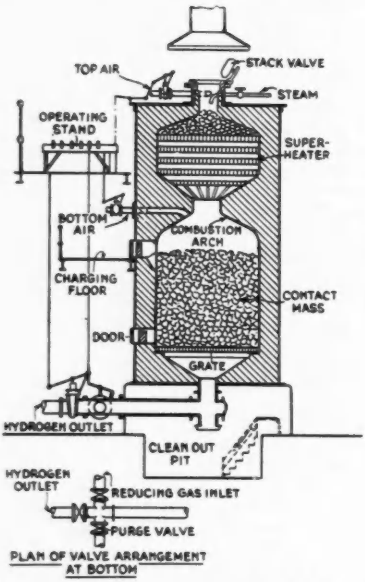


Fig. 1. Bamag generator for hydrogen production by the steam-iron process. (Hurst).

Built with an outer steel shell lined with refractory brick, the Bamag retort comprises a lower generator compartment and an upper section, known as the superheater, filled with chequer brick.

A combustion arch located at about two-thirds of the depth of the retort from the base supports the superheater, the general construction at this point being decidedly waist-like. The mass of ore in the generator rests on a perforated iron grate, below which is the main pipe connected to the reducing gas inlet, the hydrogen outlet and the purge valve. At the top of the retort are the stack valve, steam inlet, and burn-off air valve, while secondary air is injected at a point just below the combustion arch. Suitable doors for charging and discharging the ore mass are provided in the side of the retort.

A comparison in methods of construction is provided by the design of the Humphreys and Glasgow Retort shown in Fig. 2. This plant, a modification of the original single-retort system, comprises a cylindrical steel vessel lined with refractory brick. In the centre of the retort is a vertical cylindrical regenerator chamber filled with chequer brick. The annular space between the wall of the regenerator chamber and the outer wall of the retort forms the ore chamber, containing the charge of calcined spathic iron ore. The only valve connections at the top of the retort are the secondary air inlets. At the bottom of the chequer brickwork chamber are the steam inlet and the main outlet to the stack. An annular manifold underneath the grate of the ore chamber connects with the pipe through which blue-water gas enters during the reducing phase or through which hydrogen leaves during the steaming phase, depending on the appropriate valve settings. Constructional difficulties are much greater in the design of the Bamag generator, the alternate heating and cooling of the combustion arch setting up considerable strains and causing severe wear on the brickwork. The one-way direct flow of the gases through the generator, however, makes for much greater efficiency than in the other design illustrated.

The cycle of operations is substantially the same in both plants, comprising heating-up, reducing, purging, steaming, and burning-off. During the heating-up period, which may occupy up to several days, blue-water gas or other suitable combustible gas is burned and passed through the chequer brickwork or superheater. In the Humphreys and Glasgow design the gas is ignited at the foot of the regenerator, the products of combustion passing subsequently downward

through the ore bed. With the Bamag design the cold gas passes up through the ore, being ignited only at the combustion arch. The ore bed is heated by radiation from the arch, or by interposing periods of steaming when the heat from the superheater is carried down into the ore bed, the gaseous products being allowed to escape to the atmosphere.

When the required temperature has been established in the generator, the normal cycle of reduction and steaming phases is inaugurated. Reducing gas (normally blue-water gas) passing upward through the ore bed reduces the contact mass to a mixture of ferrous oxide and metallic iron. The combustible portion of the reducing gases remaining is ignited by the admission of secondary air above the ore bed, the heat from the gases then being absorbed in the chequer brickwork. To remove the last of the reducing gas and any gaseous impurities still remaining in the ore bed a steam purge is employed before the actual production of hydrogen. Steam is passed into the regenerator through the preheated chequer brickwork just as in actual hydrogen production, but the gaseous products are vented to the atmosphere for a very short period. The purge valve is then closed and the gaseous products pass to the hydrogen container.

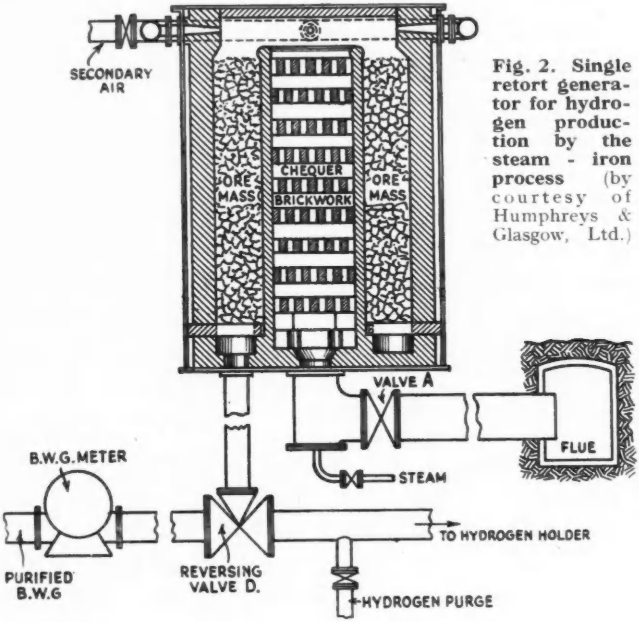


Fig. 2. Single retort generator for hydrogen production by the steam - iron process (by courtesy of Humphreys & Glasgow, Ltd.)

Varying amounts of carbon and sulphur accumulate in the ore contact mass during each reduction period, and although a certain proportion of these impurities is removed during steaming, a " burn-off " period is usually necessary to limit these elements to a low percentage. During the burn-off period air is introduced through the chequer brickwork, passing thence to the ore mass. Combustion of carbon and sulphur by air is exothermic and careful control of the temperature is necessary to avoid sintering the ore mass. When employed during each cycle, the burn-off period need only be of a few seconds' duration.

The important factor in determining the efficiency of a steam-iron plant for hydrogen production is the ratio of reducing gas required for unit volume of hydrogen produced, this factor in turn determining the ratio of reducing time

to steaming time. Two points of importance may be stressed: First, the efficient absorption of heat by the superheater, to maintain even temperatures throughout the cycle; and second, the maintenance of the ore contact mass in the most porous and open condition to facilitate complete oxidation and reduction. With the older design of plant the ratio of blue-water gas to hydrogen produced was approximately $2\frac{1}{2}$ by volume while the ratio for steaming time was approximately 2. These figures have been steadily reduced, and one of the largest manufacturers claims that the most modern plants operate with a ratio of water gas to hydrogen of 1.4.

Although hydrogen of 98 per cent. purity may be produced by this method, the removal of the residual impurities may be absolutely essential if the hydrogen is to be employed in catalytic processes. Hydrogen sulphide and carbon dioxide and monoxide are the impurities commonly met with in hydrogen thus produced, and the removal of these gases

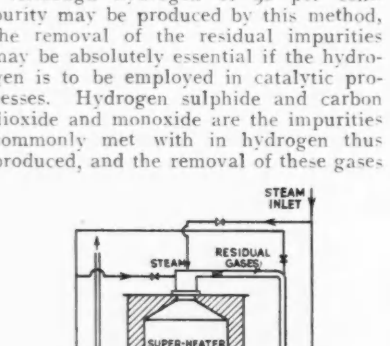


Fig. 3. Generator incorporating catalyst chamber for elimination of carbon monoxide from the hydrogen produced (B.P. 538,348).

down to the low limits required for catalytic work presents many problems. The fuel from which the reducing gas is produced constitutes the sole source of the impurities and in consequence a purification stage may be inserted before the gas enters the generator. Loss of the sensible heat in the reducing gas is the most serious objection to this procedure, but by employing some system of preheating the purified reducing gas this objection may be overcome.

An interesting two-stage purification cycle using sodium hydroxide solution has recently been patented.[3] From the generator the hydrogen passes through two absorption towers in series, in the second of which it meets a 10 per cent. sodium hydroxide solution. In this absorption tower the carbon dioxide is removed with the formation of sodium carbonate, any traces of hydrogen sulphide being eliminated by the formation of sodium sulphide. When the sodium hydroxide content of the absorption solution has fallen to about 0.5 per cent. the solution is pumped to the first of the towers. Hydrogen sulphide is rapidly removed by a sodium carbonate solution, so that the gas leaving the first absorption tower contains only traces of this impurity. This same solution, consisting mainly of sodium carbonate, is then circulated to a third absorption tower where the blue-water gas is purified before it enters the hydrogen retort. Carbon dioxide and hydrogen sulphide may also be removed from the hydrogen by the use of organic amine solutions such as diethanolamines.

Carbon Monoxide Removal

The presence of carbon monoxide in the hydrogen produced by the steam-iron process is probably the most objectionable feature of all. Reference has already been made to the necessity of "burning-off" periods between the steaming and reduction phases of the cycle to eliminate traces of sulphur and carbon deposited in the ore mass. Deposition of carbon may occur through the decomposition of the carbon monoxide in the reducing gas in accordance with the reaction :—

$$2CO = CO_2 + C \quad \ldots\ldots\ldots\ldots \quad (5)$$

which is catalysed by the presence of iron oxide in the range 400-700° C., reaching a maximum at 550°. Deposition of this carbon on the ore mass is highly unde-

sirable, as carbon monoxide is formed during the steaming phase, contaminating the hydrogen produced. A new patent[3] claims that the temperature of the ore mass may be kept in the range 700-900° C. by using the surplus heat in the mixture of hydrogen and undecomposed steam leaving the generator to heat the ingoing reducing gases. By raising the temperature of the ingoing gas to about 700°C., deposition of carbon in the ore mass is substantially prevented. Mention will be made later of a plant design incorporating provision for preheating the reducing gases.

Internal Catalyst Chamber

Another suggested method of carbon monoxide elimination is the provision within the generator of a catalyst chamber through which the hydrogen and excess steam are passed. As shown in Fig. 3, the generator is of the type incorporating a superheater supported on a combustion arch directly above the ore mass. The catalyst chamber, located in the base of the generator, consists of a series of short vertical tubes housing the catalyst. Heat is provided in the annular space around the catalyst tubes by circulation of hot waste gases developed during the reduction period. In these circumstances the waste gases do not escape from the superheater to the stack, and extraneous heat may be necessary to maintain the catalyst chamber at the optimum temperature. During the steaming phase the hydrogen produced emerges, together with the excess steam, from underneath the grate supporting the ore mass, passing thence directly through the catalyst tubes. The catalyst composition suggested is a precipitated mixture of iron and chromium oxides activated by alkaline or magnesium compounds. In the presence of the catalyst the traces of carbon monoxide in the hydrogen react with the excess steam to form hydrogen and to liberate carbon dioxide. A later addition to the patent[5] calls for the injection of additional steam between the ore mass and catalyst, the steam being superheated by the use of the sensible heat in the spent gases from the generator. The carbon dioxide formed, together with any hydrogen sulphide existing in the gases, is removed in any of the absorbent systems already discussed.

(*To be continued*)

Exports to Turkey

Applications for Licences

EXPORTERS are informed that applications for licences to export to Turkey goods included in the following list can be considered only if recommended by the British American Co-ordinating Committee (B.A.C.C.). Exporters should, therefore, advise their Turkish consignees to submit their orders for such goods through the Turkish Bureau Centrale des Commandes for examination by the B.A.C.C. The recommendation of the B.A.C.C. does not, however, necessarily insure the automatic issue of an export licence.

Notice of B.A.C.C. recommendations will not normally be required for *bona fide* trade samples or individual consignments totalling £5 or less in value. It should be noted that any abuse of these concessions may lead to their withdrawal.

A list follows of those items which are of interest to the chemical and metallurgical industries.

Fish oils and fish liver oils, oleic acid, riboflavin, stearic acid, wool grease, casein, vitamins and vitamin oils and concentrates, lubricating oils, petroleum, vegetable oils and fats, vegetable tallow and wax.

Acrylonitrile polymers and copolymers, butylene polymers and copolymers, melamine aldehyde resin, mica and products, paraphenyl phenol resins, phenolic resins, polyvinyl acetate, polyvinyl acetate resin, polyvinyl alcohol, quartz crystal, styrene polymers and copolymers, vinyl polymers, moulding powders.

Non-ferrous metal ores and concentrates, non-ferrous metals and semi-manufactures, iron and steel and semi-manufactures thereof, ferro-alloys, valves, taps and cocks of non-ferrous metal.

Acetaldol, acetic acid, acetone, agar, alkanolamines, aniline, arsenic, atebrin, atropine, belladonna, benzene, bichromates, butyl acetate, butyl alcohol, caffeine, calcium arsenate, calcium carbide, calcium metaphosphate, carbon tetrachloride, cellulose acetate, chlorine, citric acid, diacetone, dichlorodifluoromethane, dicyandiamide, diphenylamine, emethine, ephedrine, ethyl acetate, ethyl alcohol, ethyl cellulose, formaldehyde, furfural, glycerine, ethylene glycol, glycol ethers, guanidine nitrate, hexamethylene tetramine, ipecac, isopropyl alcohol, lead arsenate, marpharsen, melamine, menthol, methanol, methyl ethyl ketone, methylene chloride, neoarsphenamine, nicotinic acid, nicotinamide, pamaquine naphthoate, parahydroxydiphenyl, phosphorus (white or yellow), pyrethrum, dimethyl glycol phthalate, phthalic anhydride, potassium chlorate, quinine, sodium arsenate, sodium nitrate, sulpha drugs, tartaric acid, theobromine, thiamine hydrochloride, toluene and toluol, tryparsamide, urea, xylene.

Chemicals in South Africa

Some Recent Developments

from Our Cape Town Correspondent

AN illustration of the interest South African manufacturers are showing in organising for post-war competition is given by the erection of a new factory by New Clifton Manufacturers, an enterprise engaged in the manufacture of glues, at Industria, Johannesburg. Modern methods of factory planning have been used to achieve efficiency in production. A 200 h.p. cable has been installed which, with two new grinding outfits, will increase milling and production eightfold, thus reducing costs of production.

New Adhesives

Special attention has been paid to scientific research and control. The laboratories occupy over 2500 sq. ft. and are fully equipped for research work connected with glues and adhesives. Two full-time research chemists are employed and, as a result of their work, a new casein glue has been produced. Normal casein glue has an alkaline reaction and stains delicate woods, veneers and paper. The new glue is slightly acid, thereby avoiding staining, which is claimed to be a great advantage in the manufacture of furniture. The glue stays liquid for many hours, whereas the old formula necessitated daily mixing and waste. The new glue has the advantage of tackiness equal to bone and hide glue—a feature which, according to the company, had not previously been achieved in a casein glue. The manufacturers specialise in the production of casein glues made from an agricultural by-product formerly wasted. Their activities have thus been of benefit to farmers.

Co-operating closely with other industries, thereby increasing the scope of glues, they produce many adhesives for special purposes. One example is a recently invented universal labelling glue, suitable for labelling on tin, glass, cardboard, paper, rubber and leather. Previously, each product required a special adhesive, but the new glue is suitable for firms requiring a cheaper all-purpose product. A wall size in 1 lb. cartons for household use, and a cold glue in 1 lb. cartons for general use, are two additional new lines. A liquid glue that was discontinued for some time is now back in production with added strength and increased tackiness and quicker drying qualities. These products have been accepted by Government departments for war work after rigid tests.

African Oxygen and Acetylene (Pty.), Ltd., recently opened a new factory for the manufacture of oxygen and dissolved acetylene at Westbank, East London. This is the firm's eighth factory in South Africa, the other factories being at Germiston, Pretoria, Vereeniging, Bloemfontein, Cape Town, Port Elizabeth and Durban. The head office is in Johannesburg. Owing to the increasing demand for oxygen and dissolved acetylene in the Union, it was necessary to make this further expansion. Apart from increasing production of industrial gases, the new factory will minimise delays in transport of gases to the East London area, which previously received supples from Durban or Port Elizabeth. This speed-up in deliveries will also result in a substantial conservation of gas cylinders—an extremely important consideration under present conditions.

Among new brands being manufactured in South Africa is a concentrated superfatted antiseptic soap, a paint remover, a utility glue, and sealing wax. The antiseptic soap is packed in 125 lb. drums. The new glue is claimed to have great adhesive power, it can be used to affix metal to wood, metal to metal, rubber and cloth to metal, and joining heavy cardboard. It is packed in sizes ranging from 4 oz. tins to 50 lb. drums. (General Chemical Corporation, Box 3389, Johannesburg).

At the annual meeting of the National Chemical Products, Ltd., the chairman said that they were substantially enlarging two plants in order to meet the growing demand for solvents

Relco Chemicals (Pty.), Ltd., 110 Durban Street, Johannesburg, are now making magnesium stearate, zinc stearate, and aluminium stearate, and a new ammoniated cleanser, packed in 45-gal. drums. This firm is also making sulphonated whale oil for tanneries.

Sir Alexander Gibb regrets that in his recent address to the Institution of Chemical Engineers on "Hydro-Electric Development in Great Britain" an incorrect figure was quoted for the percentage cost of power in the manufacture of electrolytic magnesium. The figure should have been 20 per cent. (*not* 2 per cent.) which at a power cost of $\frac{3}{4}$d. a unit might make difficult the production of this material at competitive prices. The necessary correction should be made in THE CHEMICAL AGE for November 11 (p. 468, col. 2, 4th line from foot), and the words "with the exception of electrolytic magnesium." at the end of the paragraph, deleted.

Contact Thermometers

A New Precision Instrument

THE new era of research which is bound to come after the war will demand a wider distribution of those precision instruments which during the war years have been in the hands of a restricted few. The recent wonderful achievements in chemistry, physics and medicine would have been impossible without the precision instruments that exact science requires.

Temperature is a factor which is vital in practically every laboratory test and yet still it is not always acknowledged as the determining factor. It makes all the difference if a moisture test is made at 100° C., or at 155° C., since decomposition often takes place at the higher temperature (Fig. 1). It may make all the difference whether it is

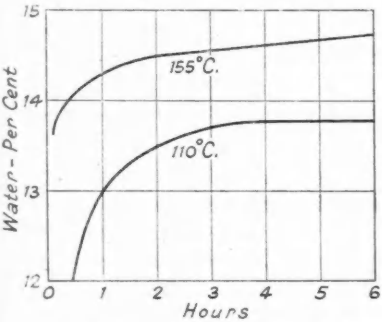


Fig. 1. Moisture tests on flour.

made at 99.5° C. or at 100° C. It is essential in many cases that water baths for physiological and other tests be maintained with an accuracy of 1/10° C. where formerly 1° C. was considered quite satisfactory. The scientific developments of the last few years have necessitated this greater accuracy.

This same accuracy of control is responsible for the development of contact thermometers. Many scientists who have not used this instrument have asked: What is a contact thermometer? Some have considered it to be one of those new-fangled inventions doomed to be forgotten. But although on a much smaller scale than such inventions as the motor car and the wireless—which themselves were scoffed at in their day—they certainly have come to stay because they are sound and fulfil a real want.

In an ordinary thermometer we have the mercury bulb at the bottom, the capillary, and the silvery thread of mercury which rises up it. Now suppose we place two wires capable of carrying an electric current in the capillary. When the mercury passes both of them it will complete an electric circuit and can switch on or off any

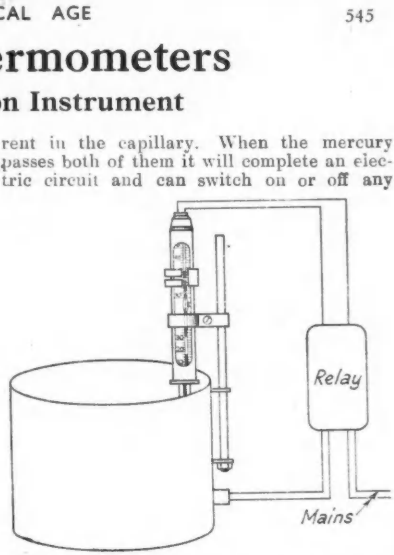


Fig. 2. Water-bath controlled by a Voss patent thermometer.

mechanism such as a heater. A relay must be used as well since the mercury thread in the thermometer will only carry a very small current and heaters run off the mains, but for alarm bells or pilot lamps no relay is necessary since they will run off a 4-volt battery or transformer (*see* Fig. 2).

What, it may be asked, is the purpose of contact thermometers? If we place the top wire in the capillary at a particular temperature, say at 100° C., it will then switch the heater on or off every time the mercury passes it and will in fact keep the bath or air, or whatever the thermometer is immersed in, at one and at only one particular temperature.

There are two types of contact thermometer, namely: fixed contact thermometers and adjustable contact thermometers. The fixed type comprises thermometers where the contacts are fused into the capillary and cannot be moved. The fixed contact point at which the thermometer is to operate must be specified by the user. They are made with or without metal cases and are also fixed on boxwood scales. These thermometers are ideal for work at one temperature only.

The adjustable contact thermometer will control temperatures at various points. It is provided with two scales: the upper one for adjusting and setting the movable index to any temperature desired, the lower one for measuring temperature. Adjustment is made by means of a magnet sliding over the thermometer which at the same time holds

the index in position once it has been set to the desired temperature. A fine wire extends from the index into the lower capillary. When the mercury rises it touches the lower end of the contact wire thus closing the circuit.

Fig. 3 shows, on the left, the simplest type of fixed contact thermometer, of a kind

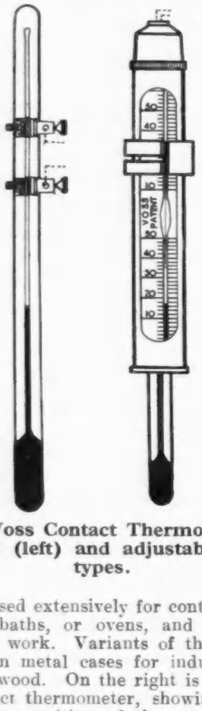


Fig. 3. Voss Contact Thermometers of the fixed (left) and adjustable (right) types.

which is used extensively for controlling oil- or water-baths, or ovens, and in general laboratory work. Variants of the type are mounted in metal cases for industrial use, or on boxwood. On the right is an adjustable contact thermometer, showing the two scales. The position of the upper contact wire can be adjusted at will by means of a magnet. Voss Contact Thermometers are patented, and are made by Voss Instruments, Ltd., 100 Village Way, Neasden, London, N.W.10. They can be made to buyer's specification as regards dimension and fixed points, and with ranges between -35°C. and 400°C.

The Ministry of Food announces that the only changes in the existing prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large users during the four weeks ending December 30, are: castor oil reduced by £10 to crude firsts £82, seconds £80 per ton naked ex works; rapeseed oil increased by £3 to £38 per ton naked ex works.

Mechanical Scrubbers

Chemical Engineers at Manchester

AT the second meeting of the North-Western Branch of the Institution of Chemical Engineers, held at the Manchester College of Technology on November 18, with Mr. J. McKillop in the chair, Mr. G. Lowrie-Fairs read a paper on "Calder-Dox Scrubbers and the Factors Influencing their Performance." This mechanical scrubber consists of orifice, impact and collector plates which remove acid mist from sulphuric acid concentrator exit gases. The distance between the plates is limited by the diameter of the orifices in the plates but the overlap of the orifices in the orifice and impact plates has only a small effect on the pressure drop which should be 4-6 in. w.g. across these plates, one orifice and one impact plate giving the best results. The particle size and the particle-size distribution of the mist have important effects on the efficiency of the scrubber which can remove particles above 2μ dia. under good conditions. The scrubber should operate at 110-120°C. at such a gas velocity that re-entrainment of particles is impossible. Methods of sampling mists, diagrams, and a mathematical analysis completed a paper which sets a high standard for the new branch.

U.S. Antimony

Larger Textile Uses

ANTIMONY is used as an alloying agent in the non-ferrous metal industries, while some of its compounds are employed in the production of pigments, in the vulcanisation of rubber and in enamelling, though on a small scale. However, according to statistics published by the United States Bureau of Mines, consumption in the non-metal industries has increased during the last two years. In 1943, non-metal industries used 10,329 short tons of the metal, compared with 9179 tons in the metal industries. This is due to the use of large quantities of antimony in the textile industries for the treatment of tent materials, camouflage netting, and for rot-proofing and flame-proofing. Antimony consumed by the U.S. textile industry totalled 6952 short tons, thus making the industry the largest single user of the metal. While war factories are responsible for this development, there is reason to expect that antimony will continue to be in demand by the non-metallic industries after the war. China's antimony deposits, the largest in the world, will hardly be available in large quantities for some years to come; at the same time both North and South America have entered the market, a fact which should bring about a lower and less fluctuating price level.

A CHEMIST'S BOOKSHELF

RECENT ADVANCES IN PHYSICAL AND INORGANIC CHEMISTRY, 7th Ed. By Alfred W. Stewart, D.Sc., and Cecil L. Wilson, M.Sc., Ph.D. London: Longmans. Pp. 512. 28s. net.

This new edition of a well-known work has been revised and largely re-written after a lapse of 14 years. Much has been discovered within that period and Dr. Stewart's older text now owes a great deal to the obviously enthusiastic revisions and additions of Dr. Wilson. There are many new illustrations, and among the new subjects are deuterium and its applications in chemistry and bombardment, the newer developments in radio-activity and their influence on our ideas of atomic nuclei, the architecture of crystals, the structure of solids, electronic diffraction, and the newer ideas on electrolytes.

Advances in modern science are so great and so rapid that the greatest authorities in specific fields are constrained to speak with no little caution when their work touches other fields. An authority in one field may be, and usually is, a student in others. It is thus of the first importance that books of this character should be written at regular intervals to enable teachers, investigators and others to keep in touch with ideas in other directions. It can be said at once that the authors have succeeded in giving a remarkably clear picture of the present state of knowledge in their field, and moreover that it requires the minimum of mathematical knowledge to follow a subject which in many respects is essentially mathematical. It is, in short, an eminently readable book.

The difficulties and uncertainties of the subject are not neglected. The evidence is given, and an account of modern thought and work is set forth, but after the reader has been given the story he is given the author's appraisal of what has been done. Thus, the Bohr model of the atom seems to have been accepted by many as a proven fact. It has, indeed, much in its favour, but the authors do not hesitate to point out that as an actual mathematical proposition it covers only two cases, hydrogen and ionised helium. This is given as an example of the critical method used in the book, and it is of immense value in steering the non-specialist reader through a maze which is becoming each year more involved.

The book consists of 27 chapters, starting with a discussion of the change in scientific outlook as typified by the older and the newer chemistry. This indicates the fundamental change that has taken place in our ideas on the atom and thence on the nature of chemical reactions. Atomic structure and the events to which it gives rise are discussed by reference to line spectra, X-ray spectra, radio-activity, disintegration theory, radon, thoron, and actinon, isotopes, isobars, positive rays, and the mass spectrograph. This leads to a discussion of deuterium, the discovery of which has had a number of far-reaching implications.

Consideration of the disintegration of the atomic nucleus leads to artificial radioactivity and to the structure of the atom, in which both nucleus and outer sphere must be considered. It is concluded that the present is an unpropitious time for the discussion of any settled theory of the nucleus, though it can be said with fair certainty that the only particles in the nucleus are protons and neutrons. The nature of the binding forces are still obscure, and the ordinary laws of attractive and repulsive forces provide no satisfactory basis. The several possible atomic models seem to be falling into their place in the whole picture and it is believed that present-day ideas about the outer structure "certainly cannot be far off the mark." The structure of crystals, of solids and the influence of structure upon electron diffraction are allotted three chapters. The conductivity of electrolytes is discussed in a very good chapter. Two chapters deal with hydrides and their position in the periodic table, and three are concerned with emission spectra including the very interesting field opened by the discovery of testa-luminescence spectra which, we believe, was discovered by Dr. Stewart and his co-workers.

The concluding chapter contains the chronological sequence of the discoveries that assisted in elucidating the structure of the atom. Have we yet reached finality? For answer we quote the last paragraph of this absorbing book. "The present generation has seen a wonderful change in the face of chemistry. Dogma after comfortable dogma has been overset; most of the old foundations have proved rather sandy when the spade went deep enough; but on the older ruins a new edifice of theory has been erected, so well designed and so securely buttressed by experiment that it seems destined to stand for our time at least. Yet in that very completeness lurks the possibility of a recurrence of the old danger; and it is to be hoped that when the time of decay eventually arrives, these present-day ideas will not be regarded as infallible. Dogmas have no proper place in the scientific field; and when they are allowed to flourish, their only result is the stifling of that spirit of inquiry which is the fundamental quality of the scientific mind." This is pre-eminently a book written by two scientific minds, who, unlike many scientific minds, fully appreciate the difficulties and needs of those who are not specialists in their particular branch of the subject. We can fully recommend it.

PROBLEMS IN THE UTILISATION OF SMALL COALS, published by the British Coal Utilisation Research Association. London: H. K. Lewis. Pp. 294. 15s.

The war-time need to use fuels of a character and size novel to many users led to a two-day B.C.U.R.A. conference on the subject. This conference was divided into three sessions, the first of which was concerned with the utilisation of small coals and slurries, the second with the utilisation of fuels of high inert content, and the third with the upgrading of fuels. The book under review gives in full all the papers, addresses and discussions at each day's meeting. Many in the chemical industry, who have been constrained to use these fuels, will welcome this account of the experience of experts and in some instances of the methods put forward by the manufacturers of plant. The whole book comprises a highly interesting summary of present-day knowledge on this important problem, though, being the record of a conference, clear cut recommendations do not necesnecessarily emerge.

Use of these fuels must not be taken as a purely war-time expedient. Sir Lewis Fermor, speaking as a geologist, pointed out that the average quality of the coal extracted from the seams of this country is falling not only because of changed methods of mining, but because there has been selective extraction of the best seams. Another important problem is that of the coal left underground. This is far higher in proportion than it should be and constitutes a waste of about half our coal resources. One of the best ways of helping us to extract the largest possible percentage of coal underground is to use firing methods which enable coal seams of lower grade to be worked. The tendency is to design mechanical stokers to deal with high ash fuels. We commend the proceedings of this conference to industry for both present and future application.

Wood Flour

A Manual on its Uses

CASUAL comment is often made on the apparent waste of raw material in the quantities of sawdust produced at timber-mills. Up to date, full use has not been made of the potentialities of sawdust, but the story of how it has been utilised and an indication of how its uses might be extended are contained in the illustrated booklet, *Woodflour*, by W. S. Dahl (published by the author at 30 Stanley Road, London, S.W.14), a pioneer in the usage of this material. Largely at his instance, the first wood-flour mill was erected at Fredrikstad, Southern Norway, in 1906; and there are now five mills in England and two in Scotland, the largest being that of Wood Treatment, Ltd., with a pre-war output of 7000 tons a year.

To achieve satisfactory results in the manufacture of wood flour, Mr. Dahl says, the sawdust must be graded so that the feed to each grindstone will produce material of uniform size. The best sizes and qualities are produced by stone grinding, though beater machines are used in some English mills. Softwood waste has found the largest number of applications, notably Baltic red and white fir, but hardwoods, with their lower hygroscopic factor, might produce a more evenly dried material.

The most prominent use which chemists have found for wood flour is as a filler for plastic moulding powders; it is also employed, mixed with short-fibre asbestos and synthetic resin, in brake linings. Fir-wood flour (50- and 60-mesh) is used in dynamite making, and up to 120-mesh as a filler for explosives, where balsa-wood flour has also been found useful. Finer softwood flour (180-mesh and impalpable) is used as a coating for arc-welding electrodes, to provide the so-called "gas shield." Coarse-mesh softwood flour finds applications in abrasives and degreasers, while finer-mesh flour of the same type has been employed as a filler in wrapping paper. "Mineralised sawdust," *i.e.*, softwood flour with an admixture of sodium silicate or calcium chloride, is used in sawdust concrete.

Among applications of the hardwood types, oak flour (80-mesh) has been used as a carrier for phenolic insecticides in powder form, while fine-grained Turkish boxwood flour, because of its high tannin content, has been suggested as a material for synthetic soles and heels for footwear.

RDX IN CANADA

A recent issue of *Canadian Chemistry and Process Industries* contains an interesting description of the production of RDX which results as a white crystalline powder from a specialised nitration of hexamethylene tetramine and is used with good results in combination with TNT. While certain details are still on the secret list, it may nevertheless be said that reaction takes place in specially designed converters, where temperature and heat control are critical. The RDX slurry flows into stainless steel tanks with a capacity of 600 gallons, from where it is filtered and washed on large open suction filters. Purification takes place alternatively in steam-jacketed kettles or by means of a dissolving and recrystallising process, using acetone and water. From this point on RDX is kept in a wet state until its incorporation with TNT, or otherwise prepared for ammunition filling. Output is reported to be in excess of designed capacity and is still increasing.

LETTER TO THE EDITOR

German Chemical Superiority

SIR,—The letter from Mr. A. Krajkeman, which appeared in your issue of November 25, is very encouraging to those who believe, as I do, that this country must take the place of Germany as the leader of European science. It links up with the letter in the *Daily Telegraph* of November 27 by Mr. G. S. Williams, who explains how the Germans have used their scientific literature to ensure their supremacy in all scientific matters.

Is it not time that the British Government showed some signs of recognising the importance of such questions as are raised by these two gentlemen, and took steps to do something about it? Some of your readers may remember reading an article in the *Evening Standard* by Squadron-Leader Murray Harris concerning the plan for disarming Germany by prohibiting or controlling her production of synthetic nitrogen and hydrogen products used for explosives and fuel, and which is given in full in his book *The Logic of War.*

I wrote to him and gave him some details concerning the work which I am doing on behalf of the "Master Key" Industries. His reply came from New York and I think it is worth while quoting part of it. He says: "Your suggestions that the Master Key Industries should be made independent of the hazards of ordinary commerce has my entire approval, but unfortunaely we know how incapable most politicians are of appreciating the vital importance of these Master Key Industries (the name is well found)."

He goes on to suggest that if I fail to get Government support I might do well to try to get subsidies for these industries from private sources. To ensure that British science shall lead in Europe and in the British Empire, £20,000,000 is needed. The money should be spent on preparing and distributing every form of scientific literature, text-books, and books of reference in each European language; and on developing a number of highly specialised sections of the scientific-instrument industry that cannot hope to hold their own unless much larger sums are spent in development work than any individual British firms can hope to spend. Can we hope to get so much money from private sources? The answer is obvious, especially in these days of high taxation. The Government should act, and take steps to ensure that these industries are developed and that British scientific literature and equipment is in every continental laboratory They alone can find the money.

To-day, many of us are horrified to find that instead of being allowed to build up our industries in order to be prepared for the enormous demand for scientific equipment that will arise when the war is over, we are being threatened with a further withdrawal of skilled labour. To quote one example: the supply of industrial thermometers is an industry that is threatened with complete extinction if the Government plans are carried into effect. Can we expect any official of the Ministry of Labour to appreciate the significance of that action?

Again, can we expect the Ministry of Labour to appreciate the value of the application of new instruments in the steel industry. I was told recently that one firm had saved £1,000,000 already by using instruments of control that were unknown a few years ago. Our leading scientists know too much of science to be bothered with politics, and our people know too little to understand what is coming to us.

If we do not make an effort to lead we shall not lead, and if we do not lead there is no alternative but to sink to the status of a third-class power and eventually be overrun by the next aspirant to world conquest. A few of us are determined that we shall at least be able to say "You were warned."—Yours faithfully,

NORMAN SHELDON, A.R.C.S., F.R.I.C.

THE AUTUMN "ENDEAVOUR"

Prolonged association with small print, niggardly margins, and any paper that may be available, makes one particularly sensitive to the qualities of a good example of magazine production. It was all the more refreshing, therefore, to see that *Endeavour,* in its latest issue, maintains a form and appearance worthy of a record of "the progress of the sciences in the service of mankind."

Preoccupation with the look of the journal must not, however, blind one to the merits of its contents, which are varied and authoritative as usual. Lord Rayleigh deals with Meteorites, especially with the rare intermediate kind containing iron and stone in roughly equal amounts; the history and functions of the Royal Institution are recounted by Mr. Thomas Martin, who, with many years' service as general secretary, is the leading authority on the subject. Justice is amply done to John Mercer—the Father of Textile Chemistry—by Dr. A. W. Baldwin; the importance of this typical craftsman-scientist of the early 19th century has also been recently acknowledged in the American *Journal of Chemical Education.* A particularly interesting article is that by Dr. E. C. Dodds on Synthetic Œstrogens, while Dr. E. L. Taylor describes recent work in the field of veterinary helminthology, and points out the need for a fuller understanding. Finally, the much-discussed methyl methacrylate, Perspex, is described by Dr. A. Caress, who has watched its progress from the laboratory stage to large-scale commercial production.

Personal Notes

Dr. F. E. Coleman, B.Sc., A.R.I.C., research chemist, has been elected a member of Widnes Town Council, in succession to Mr. T. Pedder, who has resigned.

Mr. R. Lloyd Roberts has been released by the Minister of Labour and National Service from his appointment as undersecretary at the Ministry, at the request of the board of I.C.I., Ltd.

Professor B. W. Holman, O.B.E., M.I.Chem.E., has left England to take up the appointment of Professor of Mining and Metallurgy at the King Fuad University, Egypt.

Mr. C. A. Klein has been elected president of the Paint Research Association, and Mr. H. H. Morgan and Mr. W. E. Wornum vice-presidents. Mr. S. K. Thornley, who has served as president for a number of years, was made an honorary member.

In accordance with their announced policy of appointing senior officials of the company to be special directors, Dorman, Long & Co., Ltd., have appointed the following to be special members of the board: Messrs. D. R. Brooks (chief agent in charge of the company's Durham collieries), R. A. Hacking (controller of production), E. T. Judge (chief technical engineer), A. MacLeod (commercial manager), and J. A. Millar (treasurer).

Obituary

Mr. B. H. Tilston, who died on November 25, aged 66, was managing director of the Union Tanneries, Ltd., Warrington. He invented the Tilston-Melbourne Liming Process.

Mr. Harold J. de Q. Lenfestey, who died at Wolverhampton on November 30, was managing director of John Thompson-Kennicott, Ltd., manufacturers of water-purification plant. Mr. Lenfestey, who was 63, had been engaged in the water-treatment industry for 40 years, and his connection with the John Thompson-Kennicott companies dated from 1910.

Sir John Jacob Fox, C.B., O.B.E., D.Sc., F.R.S., F.R.I.C., the Government Chemist, died in London on November 28, aged 70. He died in harness, the active head of an important scientific department, and his departure is a loss not only to official chemistry, but to the chemical industry as a whole, where he had many friends, and wherein many who did not know him personally yet enjoyed the benefit of his influence which was always extended in the interests of the working scientist. Only last year, in a New Year's message to The Chemical Age, he wrote: "It is of the utmost importance that the position of the partially trained chemist . . . within or without the Forces should be kept in the forefront of any schemes of reconstruction. It will not be sufficient to complete the training of these people without making provision for their useful employment." The chemical profession has, indeed, lost a good friend.

Sir John Fox was educated in London, at the Royal College of Science and at Queen Mary's College, of which he became a Fellow, and his doctorate was bestowed on

Sir J. J. Fox.

him by London University. He entered Government service in 1896, first in the Excise Service, and then in the laboratory of the Department of Customs and Excise, which in 1904 became the Government Chemist's department. He rose to the position of Deputy Government Chemist in 1929, and in 1936 was selected to succeed Sir Robert Robertson as Government Chemist.

He devoted a great part of his energies, as has already been indicated, to the service of his profession, and shared largely in the affairs of the Royal Institute of Chemistry, his Fellowship of which dated from 1916. He was an examiner to the Institute on various subjects in 1925-35, vice-president in 1936-39 and 1943-44, and president in 1940-43. In 1933-34 he served as chairman of the London section of the Society of Chemical Industry, and he was president of the Oil and Colour Chemists' Association in 1930. He was appointed a manager of the Royal Institution in 1939, and in 1943 he was elected a Fellow of the Royal Society.

His services to the nation were recognised by the award of the O.B.E. in 1920 and the C.B. in 1938, and a knighthood was conferred on him in the New Year Honours list this year.

General News——From Week to Week

The Chemical Society's Library will be closed for the Christmas holiday from December 23 until December 26, inclusive.

The D.S.I.R. has just published Vol. XVI, No. 11, of its summary of current literature on Water Pollution Research (H.M.S.O., 2s.).

The application of the photoelectric absorptiometer to the analysis of cast iron is the subject of a recent report issued by the British Cast Iron Research Association.

To investigate the action of hypochlorites and related compounds and their use in making wool unshrinkable, the Textile Institute awarded its first research studentship to Mr. R. L. Kitchen, Huddersfield.

Recent specifications of the Ministry of Aircraft Production include DTD 364a, Aluminium Alloy Bars Extruded Sections and Forgings (Amendment List No. 3; 1d.); and DTD 615, Cellular GR-S Sheet (6d.).

In view of the shortage of linseed oil, the British Cast Iron Research Association has been studying its partial substitution in core mixtures by petroleum extracts. A report is being issued, at the request of the Petroleum Board, as a special publication.

The following British patents were endorsed "Licence of Right" on November 21: 543,601, Tennant, W. J. (Armour & Co.), Distillation of materials containing fatty acids; 547,168, Stevens, A. H. (Armour & Co.), Processes of and apparatus for treating fatty-acid-containing stock.

A hope that raw materials might become easier in the comparatively near future was held out by Captain Waterhouse, Parliamentary Secretary to the Board of Trade, in an address to the Perfumery and Toilet Preparations Manufacturers' Section of the London Chamber of Commerce, at their luncheon last week.

Films exhibited by the Edinburgh Scientific Film Society at the Dominion Cinema, Morningside, Edinburgh, last Sunday, included "It Comes from Coal," an illustration of the chemical wealth produced from coal. Among the wide variety of other subjects presented were two pictures involving the use of the microscope.

The Minister of Supply has made the Control of Iron and Steel (No. 36) Order, 1944 (S.R. & O. 1944, No. 1335), which came into operation on December 8. The Order withdraws (i) the restrictions on the treatment, use, and consumption of ingot mould scrap and tramway rails and (ii) the obligation to segregate scrap steel containing tungsten.

At the first annual meeting of the Scientific Film Association, on November 25, the chairman, Mr. Arthur Elton, announced that the Association was publishing a catalogue of scientific films. He also stated that the Canadian Government had appointed a representative in Ottawa to cater for interest there in scientific films.

In his presidential address to the Royal Society on November 30, Sir Henry Dale described the "V" weapons as a "monstrous perversion" of science. He reminded men of science of their share after the war, "in the new responsibility for the future of mankind, which this war's experiences have laid upon the men of goodwill in all nations."

Lord Greenwood, chairman of Dorman, Long & Co., Ltd., told the shareholders, at an extraordinary general meeting in London last week, that their company had been the principal factor in the steel construction for D-Day, and that it had played a splendid and helpful part in the reconquest of Europe.

The development of polyvinyl chloride compounds as material for surgical prostheses, or artificial features to replace lost tissue, is announced by I.C.I. Dibutyl phthalate has proved to be the most useful plasticiser and pigmentation is achieved at present by the use of cadmium red and zinc oxide. Calcium stearate is employed as stabiliser in place of the more usual, but more toxic, lead salts. A gelation temperature of 140° C. has been found to give satisfactory results.

The discovery and use of "gramicidin S," a powerful bactericide, are described in last week's issue of the *Lancet*. The product of a soil bacillus, the drug has now been prepared in crystalline form, and has been found efficacious against many bacteria, including some not attacked by penicillin. It is announced that the medical council of the U.S.S.R. has issued preparations of the new substance to ten hospitals and an account of its use in 1500 cases is available.

A factory health display designed by the Public Relations Department of the Ministry of Supply in order to show the representatives of interested factories the material available for works health campaigns, will be on view at the Works Relations Centre, Ivybridge House, Adam Street, London, W.C.2, on Mondays to Fridays from 10 to 5 until December 19. It outlines the way in which these can be organised and lists the sources of posters, leaflets, exhibits, etc., available. Parties from works are particularly welcome and special arrangements for their reception will be made if appointments are previously fixed.

At the first conference of the British Coke Research Association, held at Leeds last week, the chairman, Mr. R. Alsop, stated that it was his council's intention to pass on promptly to the whole industry the results of their researches. Attention would be paid, both centrally and through regional committees, to ensuring that the fuel industries generally were kept acquainted with the results of every piece of research work.

The Control of Agar (No. 2) Order, which came into force on December 1 (S.R. & O. 1944, No. 1321), varies the No. 1 Order by adding, to the maximum price of 30s. per lb., the proviso that maximum prices per lb. for the controlled material in shred or powder form are as follows: Shred, 32s. 6d.; powder less than 60-mesh, 34s. 9d.: 60-mesh, but less than 80-mesh, 35s. 9d.; 80-mesh or over, 38s. 9d. Certain provisions as to the situation and delivery of controlled material are also included.

In his presidential address to the Birmingham Metallurgical Society on November 30, Mr. W. L. Govier (I.C.I. Metals, Smethwick) spoke on some of the problems involved in the manufacture of non-ferrous tubes, widely used in the present war for a variety of purposes. After mentioning some of the processes by which tubes are produced, he gave particular attention to the study of defects which might arise during manufacture, their classification, and the means by which they might be reduced to a minimum.

The following names are included among the 60 additions to the list of firms, etc., in neutral countries with whom dealings of all kinds are unlawful, in the Trading with the Enemy (Specified Persons) (Amendment) (No. 14) Order, 1944 (S.R. & O. 1944, No. 1305): Chemical Building Products, Buenos Aires; Aceites Essenciales Aromáticos Hanneliese Goetz, Barcelona; Aceros y Metales S.A. (Rheinmetall), Barcelona; Taller Metalúrgico "Vulcano," Montevideo. In a long list of deletions, the following are the most important: Chemie Holding S.A., Glarus; Raffineries Réunies d'Huiles et de Graisses Végétales, Geneva; Soc. des Usines Chimiques Rhône-Poulenc, Dardagny, near Geneva; Soc. de la Viscose Suisse, A.G., Emmenbrücke, Switzerland.

Foreign News

In Trinidad, a cement factory is likely to be established soon by a British group which may invest up to $3,000,000.

Publication of a new periodical bulletin, the *Non-Ferrous Forging Digest*, has been announced by the Brass Forging Association, 420 Lexington Avenue, New York.

All restrictions on the use of cryolite have been removed by W.P.B., Washington, as a safe reserve of the material and a smaller demand for aluminium production make further restrictions unnecessary.

Drums of tar, being the deck cargo, were the first items to be unloaded on November 30, from the s.s. *Fort Cataraqui*, the Canadian-built ship which was the first vessel to be unloaded in the port of Antwerp since its liberation.

The U.S. Army-Navy Production Award, for high achievement in the production of war material, has been won for the third time by the workers of the Wood Ridge (New Jersey) plant of F. W. Berk & Co., Inc., the American "opposite number" of the well-known London chemical manufacturers, F. W. Berk & Co., Ltd. This award entitles the American company to add a second white star to their Army-Navy Production Award flag.

The U.S. Alien Property Custodian announces that 2048 of the 4802 patent applications vested as property of nationals of enemy and enemy-occupied countries have been successfully prosecuted by his office and patents issued to him. As a result, many new inventions and processes have been made available for war production and to those interested in planning peace-time production, including the manufacture of magnesium from magnesite, reduction of glare from lenses, a substitute for litmus, weed destroyer, production of sugar from cellulose, and a new vitamin preparation.

Forthcoming Events

The **Royal Institute of Chemistry** (Teesside Section), jointly with the Newcastle Branch of the **Society of Chemical Industry**, is holding a meeting on **December 9,** at 3 p.m., at Norton Hall, Stockton-on-Tees. Mr. E. J. Bowen will lecture on "Chemical Links—A Story of Wave Mechanics."

The North-Eastern Section of **The Institute of Fuel** meets on **December 11,** at 5.15 p.m., at the Central Station Hotel, Newcastle-on-Tyne to hear a paper on "The Coal Seams of Northumberland," by Dr. J. H. Jones.

The **Chemical Engineering Group (S.C.I.),** and the **Institution of Chemical Engineers,** meet on **December 12,** at 2.30 p.m., in the Geological Society, Burlington House, W.1, to hear a paper on "Forestry, and the Utilisation of Waste Food and its Products as Fuel," by Mr. N. Clarke Jones.

Dr. C. H. Desch, F.R.S., will deliver the first **Harold Wright Lecture** on "The Past and Future of Steel," on **December 13,** at 7.15 p.m., in the Cleveland Scientific and Technical Institute, Middlesbrough.

The Midlands Section of **The Institute of Fuel** meets on **December 13,** at 2.30 p.m., at the James Watt Memorial Institute,

Birmingham, to hear an address by the Chairman, Mr. L. F. Jeffrey.

The Institute of Fuel, (East Midland Section) meets on **December 14,** at 3 p.m., in the Lecture Theatre of the Nottingham Gas Department, Parliament Street Nottingham, to hear a paper on "The Efficient Utilisation of Steam," by Mr. A. Milnes.

A joint meeting of the **Royal Institute of Chemistry** with the **S.C.I.,** will be held on **December 14,** at 7 p.m., at the Mechanics' Institute, Nottingham. Dr. Troil will read a paper on: "The Production of Synthetic Fibres from Vegetable Protein."

A lecture on "Rheology and the Pharmacist" will be given before **The Pharmaceutical Society** by Dr. G. W. Scott-Blair, in the Society's House, 17 Bloomsbury Square, London, W.C.1, on **December 14,** at 7 p.m., and will be illustrated by lantern slides.

The Yorkshire Section of **The Institute of Fuel** meets on **December 14,** at 3 p.m., at the Chemistry Lecture Theatre, Leeds University, when a joint paper on "Coal Tar and its Products as Fuel, and in the Chemical Field," will be presented by D. W. Milner and E. Brett Davies.

The Birmingham Section of the **Society of Chemical Industry** meets on **December 15,** at 6.30 p.m., in the Chamber of Commerce to hear Dr. J. A. Lloyd lecture on: "Some Aspects of Patents for the Chemist."

Mr. E. J. Heely will present a paper on "Some Considerations in the Design of Class I Pressure Vessels," at **The Institution of Mechanical Engineers,** Storey's Gate, S.W.1, on **December 15,** at 5.30 p.m.

The Institute of Fuel (Scottish Section) meets on **December 15,** at 5.45 p.m., at the Royal Technical College, Glasgow, when a paper on "Coal Preparation for the Market," will be presented by Mr. Jenkins.

Dr. L. R. G. Treloar (British Rubber Producers' Research Association) will lecture on: "Rubbers and their Characteristics: Real and Ideal," on **December 15,** at 5 p.m., before the **Royal Institution,** Albemarle Streeet, W.1.

The third meeting of the **Plastics Group, S.C.I.,** will be held on **December 15,** at 2.30 p.m., at Burlington House, Piccadilly, W.1., when a paper on "Kinetics of Vinyl Polymerisation in the Liquid Phase" will be read by Dr. R. R. Smith of the Research Department, The Distillers Co., Epsom.

The annual general meeting of the **British Association of Chemists** will take place at York, on **December 16.**

The Institution of Chemical Engineers (North-Western Branch) meets on **December 16,** at 3 p.m., in the Reynolds Hall, the College of Technology, Manchester, to hear a paper on "Some Principles of Chemical Plant Design," presented by Mr. W. H. Demuth.

Dr. F. M. Lea, O.B.E., will deliver a lecture on "Cement and Concrete" on **December 19,** at 2.30 before the **Royal Institute of Chemistry** at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

At a further meeting in the second series of technical discussions on Fuel Economy in the chemical industry, arranged by the **A.B.C.M.,** Mr. P. M. K. Embling and Mr. H. Truman, of the Power Gas Corporation, Limited, will read a paper on "Efficient Production and Utilisation of Fuel Gases." The meeting will take place on **December 13,** at 3 p.m., in Reynolds Hall, College of Technology, Manchester, and will be repeated on **December 20,** at 2.30 p.m., in the Lecture Hall of the Royal Society of Tropical Medicine and Hygiene, Manor House, 26 Portland Place, London, W.1. As previously, non-members of the Association are invited to the meetings and should notify: (for the London meeting) Mr. H. W. Vallender, Association of British Chemical Manufacturers, 166, Piccadilly, London, W.1; (for the Manchester meeting) Mr. W. Murray, The Liverpool Borax Co., Ltd., Maxwell House, 6, St. Pauls Square, Liverpool, 3, not later than the day before the meeting.

Company News

Thomas De La Rue & Co., Ltd., announce an interim dividend of 10 per cent. (same).

Burt, Boulton and Haywood report a net profit, for the year to June 30, of £28,914 (£18,732, after £11,500 to reserves). The dividend is maintained at 5 per cent.

Lawes Chemical Co., Ltd., reports a net profit for the year ended June 30, of £9946 (£10,741). For dividend *see* THE CHEMICAL AGE, November 18.

Tate & Lyle, Ltd., report a net profit, for the year ended September 30, of £51,455 (£59,263). Final ordinary dividend is 10 per cent., making 13½ per cent. (same).

Midland Tar Distillers, Ltd., are paying an interim dividend of 7 per cent. for the year to June 30. Net profit totals £30,197 (£27,250).

South African Druggists report a net profit, for the year to June 30, of £107,725 (£215,084). A final dividend of 10 per cent. (7½ per cent.) was declared, making 15 per cent. (12½ per cent.).

The Lautaro Nitrate Company's net profit for the year to June 30, is £325,841, a decline of approximately 43 per cent., compared with the previous year's £576,187. The dividend on the "A" ordinary shares is 2.97 per cent., and that on the "B" ordinary 3.02 per cent. (5.25 per cent. for both classes).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

A. KERSHAW & SONS, LTD. (formerly Soho, Ltd., and Amalgamated Photographic Manufacturers, Ltd.), Lymington. (M., 9/12/44.) November 17, £25,000 debenture to Branch Nominees, Ltd.; general charge. *£75,000. August 9, 1944.

RUBBER & TECHNICAL PRESS, LTD., London, S.W. (M., 9/12/44.) November 14, £700 debentures, part of a series already registered. *£325. September 1, 1944.

TURNER BROS. (SUPPLIES), LTD., Hampton Hill, general merchants, chemical manufacturers, etc. (M., 9/12/44.) November 16, £4000 debenture, to J. D. Mallinson, Totton; general charge.

New Companies Registered

Clear-Chrome, Ltd. (391,464).—Private company. Capital £100 in £1 shares. Paint and cellulose spraying contractors, enamellers, paint, lacquer and varnish manufacturers, etc. Subscribers: C. M. Clairmonte, E. Clairmonte. Registered office: 6 Hunter Road, London, S.W.20.

Major Chemical Co., Ltd. (391,527).—Private company. Capital £500 in 500 £1 shares. Manufacturers of and dealers in chemicals, drugs, fertilisers, colours, etc. Directors: W. M. Routledge, Joan Routledge. Registered office: 108 Church Street, Blackpool, Lancs.

Leopard Trading Company, Ltd. (391,283).—Private Company. Capital £1000 in £1 shares. Wholesale, retail and analytical chemists, importers of, dealers in and agents for drugs, chemicals, foodstuffs etc. The directors are: L. R. F. Payne; W. R. F. Payne. Registered office: Arcade Chambers, Catford Broadway, London, S.E.6.

Gainsborough (Twickenham), Ltd. (391,400).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in aromatic and fine chemicals, drugs, fertilisers, oils, colours, etc. Directors: S. Pollard; J. A. Webb; M. Matimong. Registered office: 99 Whitton Road, Twickenham, Middlesex.

DDT Products, Limited. (391,369).—Private company. Capital £500 in 500 £1 shares. Manufacturers of, and dealers in, chemicals for pharmaceutical, agricultural, industrial, domestic or other purposes, etc. Subscibers: A. H. Walker, C.A. and C. F. Smith. Registered offices: 41, North John Street, Liverpool.

Palisan Products, Ltd. (391,483).—Private company. Capital £1000 in 1000 shares of £1 each. Manufacturers of and dealers in chemical compounds and preparations for use in the fluxion, fusion, heat treatment and manipulation of minerals and metals, foundry requisites and engineering equipment, etc. Subscribers: Eileen Hawtin; J. Williamson (secretary). Registered office: 203 Regent Street, London, W.1.

Chemical and Allied Stocks and Shares

FIRMNESS in British Funds and steadiness in the industrial section of stock markets continued to rule, although home rails lost part of earlier gains, and the volume of business generally was moderate. An outstanding feature has been active dealings in British Celanese 10s. ordinary, which enter the dividend list for the first time since the company was made public in 1920, the payment being 15 per cent., while the participating preference receive 2½ per cent. more at 10 per cent. Compared with a week ago, the ordinary have risen on balance from 32s. to 40s. 6d., and the second preference moved up strongly to 35s. 6d., although fairly sharp fluctuations were shown from time to time and best prices were not fully held. In their statement the directors referred to improvement in the company's E.P.T. standard. The full results are being eagerly awaited in the market so that earning power can be clearly assessed; possibly there may be some indication as to whether synthetic rubber interests and other extensions of the company's activities have yet reached a stage when they can make an important contribution to profits. The rise in British Celanese stimulated activity in various other shares, Courtaulds rising to 58s. 9d. before easing to 58s., and British Enka moving up 1s. 6d. at 20s. 3d.

Imperial Chemical were little changed at 39s. 3d., yielding rather more than 4 per cent., which continues to compare favourably with the return on various other leading industrial shares. Borax Consolidated eased to 36s. 9d. and British Plaster Board to 39s 7½d., but Associated Cement were steadier at 60s., as were British Portland Cement at 90s., and Tunnel Cement at 46s. 3d. Dunlop strengthened to 48s. 3d., while British Aluminium at 45s. 9d., and

British Oxygen at 88s. 9d. were quite well maintained. B. Laporte were 82s., and W. J. Bush again 70s., with Greeff-Chemical holdings 5s. ordinary 8s. 3d. and Monsanto Chemicals 5½ per cent. preference 23s. 6d. The units of the Distillers Co. firmed up to 108s.; no change is generally expected in the forthcoming interim, the prevailing belief being that all question of an increase will be left until the final dividend when the full year's results are known.

A number of paint shares moved higher, including International Paint at 118s. 9d., while Lewis Berger changed hands around 105s. 6d. awaiting the dividend announcement. General Refractories were 17s. 7½d., Imperial Smelting 14s. 1½d., and Lever & Unilever 46s. Nairn & Greenwich moved up to 77s. 6d. awaiting the results, due in a few weeks. Electrical equipment shares were again favoured on the proposed grid extensions and post-war prospects of the industry, General Electric rising further to 97s. 3d., Associated Electrical to 57s. 6d., and English Electric to 55s. 9d. Crompton Parkinson at 34s. lost part of an earlier rise, more than maintenance of the distribution at 22½ per cent. having apparently been expected in some quarters.

The iron and steel section tended to move higher, with British Steel Construction good at 16s. 10½d., Dorman Long 27s. 7½d., Babcock & Wilcox 53s., and Allied Ironfounders 53s. 9d. Clark Chapman rose to 48s. Elsewhere, Richard Thomas rallied to 13s. 9d., and Baldwins to 7s. 3d., pending full details of the proposed amalgamation. Among textiles, Bradford Dyers were 24s., and Calico Printers improved to 17s. 9d. Among plastics, De La Rue were 192s. 6d. xd, Erinoid 5s. ordinary 11s. 7½d., and British Industrial Plastics 2s. shares 7s. 1½d. Gas Light & Coke ordinary at 22s. 10½d. were virtually the same as a week ago. Turner & Newall eased slightly to 82s., expectations being that the forthcoming dividend is again likely to be limited to 12½ per cent. It is assumed in the market, however, that with the eventual reduction or abolition of E.P.T. dividends seem likely to regain the pre-war 20 per cent. level. Oil shares were generally firmer, with "Shell" 85s. and Anglo-Iranian 112s. 6d. xd.

British Chemical Prices

Market Reports

MOST London traders report reasonably satisfactory trading conditions, with no change in the price position. Deliveries against contracts are proceeding along steady lines and a moderate amount of new business is reported. In the soda products section there is a good call for bicarbonate of soda and soda ash, while supplies of chlorate of soda and bichromate of soda are inadequate to meet present requirements. Nitrate and hyposulphite of soda are firm and in steady request. Among the potash compounds yellow prussiate continues to show a rising tendency, while ready outlets are reported for bichromate of potash and caustic potash. In other directions the lead oxides are receiving a steady inquiry and formaldehyde is a good market. Hydrogen peroxide is moving steadily and there is a good call for supplies of glycerine and white powdered arsenic. Quiet conditions prevail in the market for coal-tar products this week. A fair home trade in pitch is reported and the pyridines are steady. Creosote oil is a brisk market and a good inquiry is recorded for both carbolic and cresylic acid.

MANCHESTER.—The movements of heavy chemicals on the Manchester market during the past week have continued to be chiefly in respect of deliveries against contracts, which, for the most part, are being drawn against fairly steadily. The market, however, has not been devoid of fresh buying interest and a moderate volume of new business has included some odd lots for export. The alkalis, the heavy acids, and the magnesia and ammonia products are mostly in good demand, while potash materials are being absorbed to the full extent of the offers. Among the by-products, little export business is yet possible in pitch. Crude tar and creosote oil are in good demand, as are also benzol and toluol, but buying interest in the naphthas and xylols is less in evidence than it was a short time ago.

GLASGOW.—In the Scottish heavy chemical trade during the past week home business has been moderate. Export inquiries remain rather restricted. Prices keep very firm with no actual changes to report.

THE
BRITISH ASSOCIATION OF CHEMISTS

is the Trade Union for all professional chemists. ONE of its many activities is the UNEMPLOYMENT BENEFIT FUND.

- For a contribution of 2s. 6d. monthly, you can draw £1 a week if unemployed. For 10/- monthly, you can draw £4 per week.
- Over £3,537 paid out in benefits 1935-40.
- Reserve Funds of £34,000.

For particulars of Membership, write to :—
C. B. WOODLEY, C.R.A., F.C.I.S., General Secretary, B.A.C. 175, Piccadilly, London, W.1

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS
Key Men in Wartime and Afterwards.

MANY of the finest posts in Britain in Wartime are reserved for Chemical Engineers. The same will be the case when the war is over. The vast technique and experience now being applied to Chemical Technology for war purposes will then be suitably utilised in reconstruction, and in trade and commerce.
Enrol with the T.I.G.B. for A.M.I.Chem.E. Examinations in which home-study Students of The T.I.G.B. have now gained :—

THREE "MACNAB" PRIZES,
including the "MacNab" Prize awarded at the last (1943) Examination.

Write to-day for "The Engineer's Guide to Success"—free, containing the world's widest choice of Engineering Courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,
219 Temple Bar House, London, E.C.4.

FOR SALE

BARGAIN. Freehold Factory for sale, about 40,000 ft., Gloucester area. Requisitioned for duration at £500 p.a. Vacant possession after hostilities. All services. Good rail and canal facilities. Recently valued at £20,000. Full particulars from Box No. 2190 "The Chemical Age," 154, Fleet Street, London, E.C.4.

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

PUMP, Vertical, 3 Throw, by Bailey; 10 in. Plungers by 14 in. Stroke, geared belt drive. THOMPSON & SON, (MILLWALL), LTD., Cuba Street, Millwall, London, E.14. East 1844.

100 HYDRO EXTRACTORS by leading makers from 18 in. upwards, with Safety Covers. Jacketted Steam Copper and Iron Pans. Calorifiers-Washing Machines—Gilled Pipes, etc. List sent on request. Randalls, Engineers, Barnes. Tel.: Riv. 2436.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons Springfield Mills, Preston, Lancs. Phone 2198.

Secondhand
PROCESS PLANT
for sale.

COPPER STILL, two sections, 9 ft. 0 in. deep overall by 2 ft. 9 in. dia.; detachable phosphor bronze inspection cover to top section, secured by quick-acting swing bolts; bottom section 1 ft. 6 in. deep, secured by heavy ring and quick-acting swing bolts; nest of copper steam coils in bottom covered by perforated copper plate; complete with tubular condenser.

Copper steam jacketed **STILL** by John Dore, 3 ft. 4 in. on straight by 3 ft. 6 in. dia.; bolted-on domed cover with inspection windows; bolted-on dished bottom steam jacket; 12 in. inspection door in body of Still; unit complete with copper swan-neck and aluminium coil condenser in mild steel tank.

Cast iron Jet **CONDENSER** by Lurgi, 9 ft. 0 in. on straight, 12 in. conical bottom by 2 ft. 6 in. dia.; 16 in. flanged vapour connections; 3½ in. liquid connections; 7 in. flanged bottom outlet.

Two—Chemical lead **CONDENSERS**, 9 ft. 0 in. between tube plates by 1 ft. 6 in. dia., containing 29 lead tubes expanded into heavy lead tube plates; lead lined cast iron bodies with 8 in. dia. vapour inlets.

Triple effect **EVAPORATING PLANT** by Scott; 750 g.p.h. evaporation of water; primary stage mild steel calandria 4 ft. 7 in. deep by 4 ft. 4 in. dia.; arranged with 246 steel tubes 2 in. o.d.; second effect similar but with calandria 6 ft. 0 in. deep by 4 ft. 9 in. dia. and 323 tubes; third effect similar to above.

All copper **FRACTIONATING COLUMN** 13 ft. 6 in. high by 10 in. dia., comprising 20 trays fitted with bubbling hoods and copper coil dephlegmator at top; gas risers 1 in. int. dia., and fitted with 1½ in. dia. bubbling hoods, six to each section.

Horizontal mild steel concentric tube type Kestner **HEAT EXCHANGER**; inner tubes 7½ in. dia., outer tubes 3½ in. dia.; six banks of tubes 16 ft. 6 in. long, mounted in fabricated stand.

Two—Mild steel cased **HEAT EXCHANGERS** or **INTER-COOLERS**, 4 ft. 0 in. high by 1 ft. 3 in. dia., containing 48 'U' tubes constructed in alumbro metal; tubes ⅝ in. i.d. by ¾ in. o.d., and arranged in four passes; expanded into tube plate and bolted to vapour distribution box.

Copper surface **COOLER** by Morton, with bank of coils 4 ft. 0 in. high by 6 ft. 3 in. long; gunmetal water headers arranged with 2 in. inlet and outlet connections; unit mounted on copper trays.

GEORGE COHEN, SONS & CO., LTD.,
STANNINGLEY, near LEEDS
and WOOD LANE, LONDON, W.12
'Phone 98 Staines.

SIMON GRAIN DRYER, 8′ × 2′ 8″; Melville Brodie 3-Stage Jacketted Drier; Jacketted Mixing Kettle 5′ 6″ × 2′ 8″; 30″ Belt driven Hydro.
HARRY H. GARDAM & CO. LTD. STAINES.

SODIUM ACETATE in liquid form containing:—
Acetate ... 96%
Chloride ... less than 0.05%
Impurities ... less than 1.0%
Approximately 12 tons. Offers please. County Chemical Co., Ltd., Stratford Road, Shirley, Birmingham. SHI. 2294.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East

SITUATION VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

RELIEF Organisation Headquarters require fully qualified INDUSTRIAL CHEMIST, Science degree or equivalent, with experience in chemical or allied industries or of trade in chemicals, pulp, paper and rubber, especially wide general knowledge of commercial aspects and of main industries consuming these products. Location of work—London. Salary £800-£1150, according to experience and qualifications.

Applicants should write quoting F.3293A, to the Ministry of Labour and National Service, Central (T. and S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms which should be returned completed on or before 19th December 1944

WANTED

WANTED regularly, Residues, Sludge, Slag, etc., containing Antimony, Cadmium, Copper, Lead, Nickel and Zinc. Oakland Metal Company Ltd., Willington, Derby.

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126 THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WANTED—Volumes 2, 3, 4, 5, 9 and 10 of Mellors Comprehensive Treatise on Inorganic and Physical Chemistry. Box. No. 2189, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WORKING NOTICE

THE proprietors of the Patent No. 545,648 for "Improvements in or relating to Germicidal Soap," are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE proprietors of British Patent No. 534,609, for "EXPLOSIVES," desire to enter into negotiations with a Firm or Firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

LARGE DEPT. FOR SCIENTIFIC BOOKS

FOYLES

★ BOOKSELLERS TO THE WORLD ★

New and secondhand Books on all branches of Chemistry and every other subject. Stock of nearly three million volumes. Books bought.

QUICK POSTAL SERVICE

119-125 CHARING CROSS ROAD, LONDON, W.C.2

Telephone : Gerrard 5660 (16 lines)

Open 9-6 (including Saturday)

COUPON-FREE CLOTHING

OF SPECIAL INTEREST TO CHEMICAL WORKERS

EX-POLICE ALL WOOL SERGE SUITS (Jackets and Trousers)

Tested and found impervious to Acids, etc. Grade One Garments. Thoroughly cleaned and reconditioned.

35/- per suit

The above line has been tested in contact with all the well-known Acids and Alkalis, and has shown highly resistant qualities in all cases.

SAMPLE FORWARDED ON REQUEST.

Terms : Nett m/a. Carriage paid on orders over £10. Delivery : ex Stock.

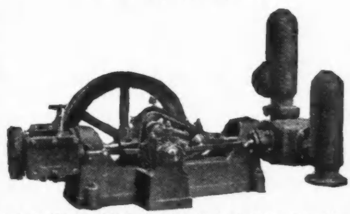
WILLSON BROTHERS

EPSOM SURREY Phone : Epsom 1293

PUMPS

AND

PUMPING MACHINERY FOR CHEMICAL INDUSTRY A SPECIALITY.



THE "RELIABLE" STEAM PUMP, for Tar and Thick Fluid. Also supplied with STEAM JACKETED PUMP ENDS. *Write for list No. 348*

JOSEPH EVANS & SONS (WOLVERHAMPTON) LTD.

CULWELL WORKS, WOLVERHAMPTON

Wires : "Evans, Wolverhampton."

'Phones : Wolverhampton 20864, 20865.

London Office : KERN HOUSE, 36 & 38, KINGSWAY, W.C.2.

Wires : "Dryosbo, Westcent, London."

'Phone : Holborn 1091

Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, December 9th, 1944. Entered as Second Class Matter at the New York, U.S.A., Post Office.